INVENTIONS & INNOVATION

Project Fact Sheet

MULTIELEMENT SELECTIVE EMITTER

A NEW DESIGN APPROACH LEADS TO THE DEVELOPMENT OF A UNIQUE, HIGH-EFFICIENCY INCANDESCENT LIGHT SOURCE

Benefits

- Offers savings of 15 trillion Btu by 2010
- Combines energy efficiency of fluorescent lighting with versatility and low first cost between halogen and incandescent lighting

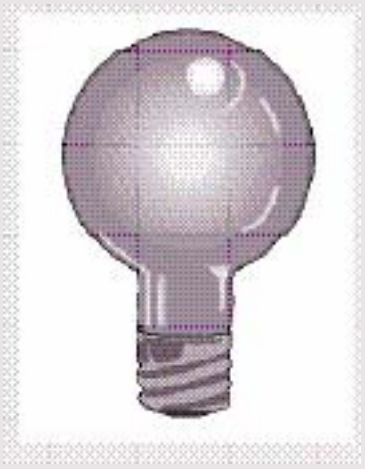
Applications

The multielement selective emitter will initially be targeted toward the residential and industrial lighting markets.

State-of-the-art incandescent bulbs waste roughly 90% of their input power and function for roughly 1000 - 2000 hours, but they are inexpensive and versatile. And while there are a number of special purpose lighting options such as metal halide, high pressure sodium, and sulfur lamps, to date only the fluorescent lamp offers an acceptable level of cost, safety, color rendering and efficiency to be a viable alternative to tungsten-filament incandescent lighting for use as a general lighting source. However, while significantly more efficient and long-lived than incandescent bulbs, fluorescent lighting has been unable to sway most residential consumers and the vast majority of residential lighting is still standard incandescent lighting. (Halogen lamps account for only about 5% of the domestic incandescent market because they are significantly more expensive and are only marginally more efficient than non-halogen incandescent lamps.) For these consumers the advantages of incandescent lighting (including intensity, full-spectrum illumination, versatility and purchase price) clearly outweigh its disadvantages.

Sonsight Inc. is developing a new type of incandescent light source that combines these advantages with an efficiency and longevity comparable to that of fluorescent lighting. The efficiency is obtained by tuning the material parameters affecting radiative transfer within a ceramic oxide composition to allow significant selective emissivity within the visible spectrum. The result is a

PROJECTED PROTOTYPE BULB



Bulb dimensions are similar to current standard sizes.

number of energy, economic and environmental benefits such as less energy use and cost, reduced CO_2 emissions, no mercury contamination, and a healthier and more productive optical/visual environment.

Project Description

Goal: The proposed work is directed at: (1) applying a new thermal stabilization approach that allows higher incandescent temperatures, (2) optimizing the radiative transfer characteristics of the emitter to shift the spectral distribution of the radiation intensity further within the visible spectrum, and (3) obtaining a prototype device that is enclosed within a glass bulb.

Progress and Milestones

The following are the main tasks to be performed:

- Apply the new thermal stabilization approach to a single-layer emitter, and characterize and optimize its performance.
- Fabricate and characterize the performance of a double-layer tubular emitter.
- Apply the new thermal stabilization approach to a double-layer emitter, and optimize its performance.
- Construct an emitter with electronic switching for rapid heating at startup.
- Mount the prototype emitter within a bulb and fine-tune the performance of the enclosed emitter.

Economics and Commercial Potential

The nearly $9 billion lighting industry is characterized by mass-market conditions involving many competitors, price sensitivity, and little brand loyalty. Primary targets in the United States (both residential and industrial) for the multielement selective emitter received shipments of about $1.8 billion in lighting in 1997. Industry experts have also identified several other potential markets, including the automotive sector.

Overall, the lighting market is dominated by three large competitors–General Electric, Philips Electronics, and OSRAM Sylvania–each with multiple substitute products. However, no competitors currently offer a product substantially similar to the invention, and there appears to be niche markets of consumers who are interested in more efficient, longer-life lighting products.

Commercial introduction of the technology is expected in 2006. Annual energy savings by 2010 would be 15 trillion Btu. By 2020 the savings would grow to 204 trillion Btu.

The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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